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ROYAL BOTANIC GARDENS, KEW

XXI—THE FORMATION OF INTUMESCENCES CONTAINING FATTY SUBSTANCES ON THE STEM OF KHAYA IVORENSIS.

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When engaged in research work in the Jodrell Laboratory* in 1929, I investigated certain intumescences on the stem of *Khaya ivorensis* A. Chev. (*Meliaceae*). The results of this study, which I have completed later, are given below. Growths of a similar nature are known to occur also on another species of *Khaya*, *K. senegalensis*, and it will be convenient to refer to these first. An account of the out-growths on *K. senegalensis* was given in an official report by Mr. A. E. Collens (1).

The following information is derived from Mr. Collens' report :—

In 1911, several trees of *K. senegalensis*, cultivated at the Experiment Station, St. Clair, Trinidad, were seen to be suffering from bark disease, and " wherever attacked, the bark was noticed to be scaling off in warty squamose pieces, which were greasy to the touch, had a strong fatty acid odour, and ignited readily when kindled, burning with a steady smoky flame."

Chemical examination showed that pieces of bark from a diseased patch (a.), and from six inches above (b.), and six inches below it (c.) showed the following percentage analyses :—

WATER	(a.) 4·94 ;	(b.) 40·31 ;	(c.) 53·63.
ORGANIC MATTER	(a.) 93·30 ;	(b.) 57·84 ;	(c.) 44·47.
ASH	(a.) 1·76 ;	(b.) 1·85 ;	(c.) 1·90.

Of the organic solid matter of the bark, fat amounted to 64·4 per cent. in the diseased portion, as against 0·5 per cent. above and below the latter. A similar scaling eruption on stems of *K. senegalensis* having been reported from Dominica in July 1916,† a further investigation was conducted with the expressed fat. Samples of the fat were obtained by means of a small screw press, and also by solvents from some freshly gathered bark. An examination of this fat showed that its fatty acid content was high,‡ and analytical data indicated that the fat was akin in character to such solid fats as rambutan tallow from *Nephelium lappaceum*, Chinese vegetable

* For permission to work in the Jodrell Laboratory I was indebted to Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew.

† By Mr. Joseph Jones, Curator of the Botanical Station.

‡ Being equivalent to 82·33 per cent. expressed as Palmitic acid, or 91·43 as stearic acid.

tallow from *Stillingia sebifera*, and mkanyi butter from *Stearodendron Stuhlmannii*.

As it appeared that the anatomical structure, formation, and development of the intumescences had not been studied, and that the cell-contents had not been examined microchemically, I undertook, on the suggestion of Mr. L. A. Boodle, then Assistant Keeper of the Jodrell Laboratory, an investigation with the object of elucidating these points in *K. ivorensis*.

The material available was preserved in alcohol, and consisted of twigs of some years' growth, cut into lengths of several centimetres. In many places the bark showed oval or irregularly oval warts, the smaller ones being white, and the larger ones of a yellow colour. The surface of the small warts was smooth, while that of the larger ones shows secondary protuberances, and was somewhat fissured. Apart from the warts, the bark was smooth, and bore numerous lenticels.

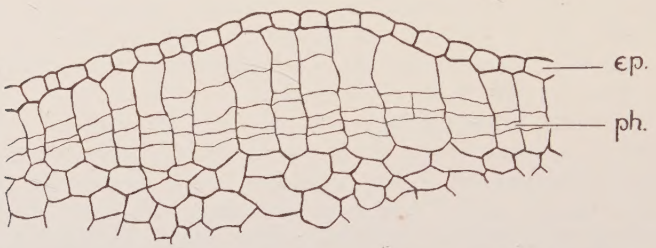

Fig. 1. Cross-section of early stage of intumescence of *Khaya ivorensis*. Ep. epidermis ; Ph. phellogen. × 225.

Anatomical investigation of sections of the bark showed that the phellogen arises by subdivision of the layer of cells immediately below the epidermis, both in areas where no warts are present, and also in the warts in their earliest stage of development*. In the case of the warts, the cells formed by the phellogen on its outer side, and morphologically representing cork-tissue, are at first of a normal shape for young cork-cells, but, as development proceeds, they become greatly elongated in the radial direction, differing markedly in this character and in their cell-contents from the normal cork produced in places where there are no warts. The anatomical structure of warts at three different stages of development is shown in figs. 1, 2 and 3, and it is seen that the radial lengthening of the "cork" cells of the warts, and also the production of a greater number of them in the radial direction, distinguish them from the normal cork, and are the cause of the formation of warts in *K. ivorensis*.

As they grow older, the cells constituting the tissue of which the warts are composed increase in their radial and tangential diameters

* The place of origin of the periderm is thus the same as that given by Moeller (5), p. 259, for other members of the *Meliaceae*.

to a greater extent than do normal cork cells. The wart tissue may thus be described as heteroplastic and hyperplastic.* Microchemical examination showed that the cell walls, unlike those of normal cork, are not suberized. When treated with concentrated sulphuric acid they became swollen and then dissolved in the acid. With Sudan III they showed no orange-red coloration, but Lugol's iodine reagent with the addition of 80 per cent. sulphuric acid caused them to become a very distinct blue colour. Neither phloroglucin with hydrochloric acid, nor aniline sulphate, nor Maule's reagent† gave any lignin reaction. It is concluded from the results of these microchemical tests that the cell walls of the layers of " cork " in the wart-like growths consist of cellulose, and that the tissue under consideration is of the nature of phelloid.

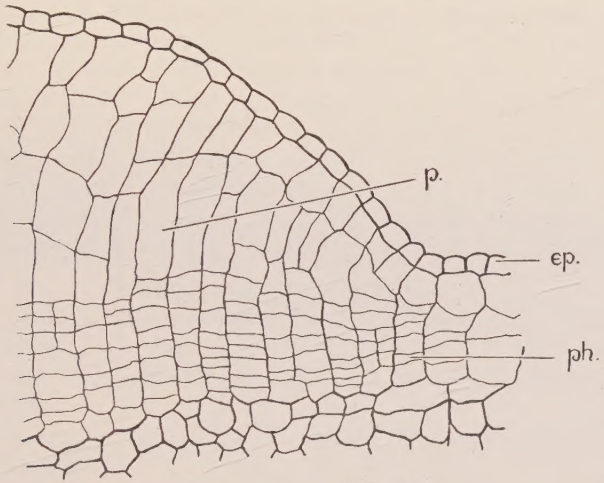

Fig. 2. Cross-section of later stage of intumescence of *K. ivorensis*. Ep. epidermis; Ph. phellogen; P. radially elongated cell of phelloid. × 225.

In the cavities of the elongated cells of the phelloid, yellowish-white masses of a more or less amorphous substance are present, forming a layer of varied thickness between the cell-wall and the remaining cavity of the cell, as shown in fig. 3, but similar cell-contents are not present in the cells of the normal cork. The special solid cell-contents mentioned above, which may have become somewhat altered by the material being preserved in alcohol, were tested as follows. When subjected to heat, they melted and assumed a spherical form. Sudan III gave them an orange colour, alkannin produced a red coloration, and in a solution of osmic acid they turned black. They were found to be insoluble in cold alcohol, but dissolved slowly in cold xylol or chloroform or more rapidly if heat was applied. Saponification gave satisfactory results, and even

* For the use of these terms, see (2) p. 132.

† Successive treatment with a solution of permanganate of potash, dilute hydrochloric acid and ammonia. See (7).

after 24 hours crystals of fatty acid appeared, and myelin shapes were formed. (See (7) fig. 60.)

The results of the above reactions indicate that the solid contents of the phelloid-cells consist of fatty substances, and it appears probable that in *Khaya senegalensis* the fatty acid material obtained from the intumescences in that species also represents the cell-contents of a phelloid tissue. Unfortunately, as suitable material for the purpose was not available, I was unable to determine the manner in which the fatty material originated in the cells of *K. ivorensis*.

A substance, which is formed in the fruit of species of *Rhus*, and is known as Japanese wax, is composed, according to Tassily (6) almost entirely of a glyceride of fatty acid, and may well be very similar in character to the special cell-contents of the phelloid of *Khaya*. The substance referred to above was studied in *Rhus vernicifera* by Möbius (4),* who found that it occurred within the cells of the mesocarp, forming a rather thick coating on the inner surface of the cell-walls, and sometimes nearly obliterating the cell-cavity. It thus occupies the same position in the cells as the fatty material found in *Khaya*. Möbius states that the coating of wax is closely applied to the cell-wall, but that its inner limit has an irregular, granular surface, and that, in the cell-cavity, the protoplasm and nucleus are long retained. Hence it appears probable

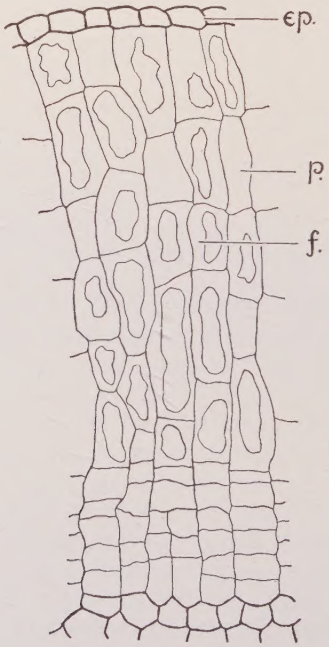

Fig. 3. Cross-section of still later stage of intumescence of *K. ivorensis*. Ep. epidermis; P. radially elongated cell of phelloid; F. layer of fatty substance. × 225.

* See also Meyer (3), and Wiesner (8).

that the wax is elaborated by the protoplasm, and deposited on the cell-wall, and it is suggested that the same applies to the fatty substance of *Khaya*.

SUMMARY.

The intumescences on the bark of *Khaya ivorensis* are due to abnormal growth of tissue belonging to the periderm, and morphologically representing the cork-tissue, but developed as phelloid.

The cells of this tissue differ in shape and size from those of the normal cork. They have cellulose walls, and contain masses of a substance, shown to be of a fatty nature by its characteristic microchemical reactions.

The intumescences and their special fatty contents appear to be quite similar to those previously described by Collens in *K. senegalensis*.

REFERENCES.

1. COLLENS, A. E. "Formation of Fat in the Bark of West African Mahogany, *Khaya senegalensis*." *Bull. Dept. Agric., Trinidad and Tobago*, **17**, 105 (1918).
2. KUSTER, E. *Pathologische Pflanzenanatomie*, 132 (1903).
3. MEYER, A. *Archiv. d. Pharmazie*, **215**, 600 (1879).
4. MÖBIUS, M. *Berichte d. Deutsch. Bot. Ges.* **15**, 435-441 (1897).
5. MOELLER, J. *Anatomie der Baumrinden*, 259 (1882).
6. TASSILY, E. *Bull. Soc. Chim. de France*, **9**, 608 (1911).
7. TUNMANN - ROSENTHALER. *Pflanzenmikrochemie*, ed. 2, Berlin (1931).
8. WIESNER, J. *Die Rohstoffe des Pflanzenreiches*, 3 Aufl., **1**, 706 and 721 (1914).

XXII—AFRICAN ORCHIDS : X*.

V. S. SUMMERHAYES.

The following paper includes the first instalment of new species, records, etc., from the very fine collection of Orchids made by M. Georges Le Testu and sent by him to Kew for determination. These orchids are mainly from the Gabon and Oubangui-Chari regions of French Equatorial Africa, those from the latter region also including many collected by the Rev. C. Tisserant. The Gabon collections, in particular, contain many remarkable plants and it is intended to publish accounts of such as are new or interesting in further papers of this series. I should like to express my thanks to M. Le Testu for affording me the opportunity of examining these collections.

Diplacorchis (§ Brachycorythoides) conica *Summerhayes*, sp. nov. ; a *D. ashantensi* Summerh. habitu multo graciliore, floribus minoribus, petalis apice rotundatis, labello apice minus lobulato, calcari conico acuto differt.

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* Continued from K.B. 1937, 466.

Herba terrestris, gracilis, 20–45 cm. alta ; radices fasciculatae, breviter pilosae. *Caulis* erectus, glaber, basi vaginis paucis instructus, per totam longitudinem foliatus. *Folia* sessilia, inferiora ovata, late lanceolata vel lanceolata, sursum angustiora et sensim decrescentia, summa in bracteas abeuntia, acuminata, usque ad 4·5 cm. longa et 1·8 cm. lata, internodiis longiora. *Inflorescentia* cylindrica, 4–15 cm. longa, circiter 2 cm. diametro, subdense pluri- vel saepius multiflora ; bracteae foliis similes sed minores, suberectae, lanceolatae, acuminatae, flores aequantes vel superantes. *Flores* suberecti, rosei vel violacei ; pedicelli cum ovariis circiter 1 cm. longi. *Sepalum* intermedium erectum, oblongo-ellipticum vel oblongo-lanceolatum, subacutum vel subobtusum, 7–8 mm. longum, fere 3 mm. latum, valde concavum ; sepala lateralia oblique oblongo-lanceolata, obtusa, 6·5–7·5 mm. longa, circiter 3 mm. lata ; sepala omnia extra adpresse pubescentia. *Petala* erecta, oblique oblonga vel lanceolato-oblonga, apice rotundata, margine antico basi dilatata, 7–8 mm. longa, 2·8–3·5 mm. lata, basi columnae breviter adnata, extra praesertim juxta costam adpresse pubescentia. *Labellum* totum 7·5–8 mm. longum ; hypochilium calcaratum, 2·7–3·5 mm. diametro, utrinque lamella alta angusta e basi columnae in epichilium breviter et sensim decurrente instructa, calcari conico acuto apice leviter incurvato 5 mm. longo ; epichilium ambitu ellipticum, apice truncatum breviter trilobatum, lobis lateralibus triangularibus incurvatis lobo intermedio dentiformi, totum 4·5–5 mm. longum, 3·8–4·8 mm. latum, dense papillato-puberulum. *Columna* erecta, 3·5–4 mm. alta, apice breviter apiculata ; antherarum loculi erecti, paralleli ; polliniorum viscidia orbicularia, nuda. *Rostellum* valde compressum, cucullatum, 1·3 mm. altum, lobis lateralibus subnullis.

Gabon. Region of Upper Ngounyé River, Pangani plain, in the savannahs of the Echiras, Nov. 1924, *Le Testu* 5088 (type) ; between Mouila and Missonnera, in savannah, Dec. 1924, *Le Testu* 5143.

This is a second species of Sect. *Brachycorythoides*, differing from *D. ashantensis* Summerh., the other known species, by the characters given in the diagnosis. *D. conica* approaches the genus *Phyllomphax* in the general appearance of the flower, particularly the conical acute spur, but differs in column structure, the large cucullate rostellum being characteristic of *Diplacorchis*. So far as I can see no bursicles for the viscidia are developed in this species, the viscidia appearing to be naked. In *D. ashantensis* the bursicles are only partly developed and in this respect the new species approaches more closely *Brachycorythis*. In fact it is a matter of opinion whether the two species should be placed in *Brachycorythis* or in *Diplacorchis* in each of which genera they would form an aberrant group. In view of our relatively scanty knowledge as to which characters are of generic importance in this group it is at present inadvisable to create an additional genus for the two species concerned.

Phyllomphax macrantha (*Lindl.*) *Summerhayes*, comb. nov. *Gymnadenia macrantha* Lindl. Gen. & Sp. Orch. 279 (1835). *Eulophia Helleborina* Hook. f. in Bot. Mag. t. 5875 (1870). *Habenaria Helleborina* Nichols. Dict. Gard. **2**, 107 (1885). *Platanthera helleborina* Rolfe in Dyer, Fl. Trop. Afr. **7**, 204 (1898). *P. macrantha* Kraenzl. Orch. Gen. & Sp. **1**, 612 (1899), 939 (1901). *Phyllomphax Helleborina* Schltr. in Fedde, Repert. Beih. **4**, 119 (1919); Summerhayes in Hutch. & Dalz. Fl. West Trop. Afr. **2**, 407 (1936).

I overlooked the above combination when writing my account of the orchids of West Tropical Africa but it seems to be the correct name for the species. Specimens collected by M. Le Testu extend the known distribution of the species to Gabon.

Cynorchis gabonensis *Summerhayes*, sp. nov.; ex affinitate *C. Hanningtonii* Rolfe, *C. Johnsoni* Rolfe et *C. Braunii* Kraenzl., a quibus floribus minoribus, labello apice valde dilatato obtuse trilobato, anthera reclinata distinguitur.

Herba terrestris, usque ad 15 cm. alta, radicibus tomentosis exceptis glabra. *Folia* radicalia vel subradicalia, 3–6, lanceolata vel oblongo-lanceolata, breviter acuminata, basi in petiolum 0·5–1 cm. longum angustata, usque ad 6 cm. longa et 1·7 cm. lata, infima ceteris saepius multo minora. *Scapus* erectus, cataphyllis 3–6 lanceolatis acuminatis instructus; racemus usque ad 3·5 cm. longus, densiuscule pauci- vel multiflorus; bracteae lanceolatae, acuminatae, usque ad 8 mm. longae, floribus breviores. *Flores* adscendentes vel erecto-patentes, colore ignoto. *Sepalum* intermedium late ovatum, apice late acuminatum, valde concavum, 2–2·5 mm. longum, 1·5 mm. latum, supra antheram incurvatum; sepala lateralia oblique semi-ovata, leviter acuminata, 2·5 mm. longa, 1·2 mm. lata, uninervia. *Petala* erecta, ambitu obovata, leviter obliqua, 2 mm. longa, 1·3 mm. lata, uninervia, dimidio antico semi-obovato apice breviter acuminato, dimidio postico multo angustiore fere recto medio lobulo rotundato aucto. *Labellum* e basi angusta oblonga subito dilatatum, antice trilobatum, lobis subaequalibus, lobo intermedio late triangulari, lobis lateralibus rotundatis, totum labellum 2·5 mm. longum, fere 2 mm. latum; calcar cylindricum, dependens, superne leviter incurvatum, subacutum, 2·5 mm. longum. *Anthera* reclinata, 0·5 mm. alta, canalibus porrectis fere 1 mm. longis; polliniorum viscidia elliptica, magna, 0·4 mm. longa. *Rostellum* porrectum, canales aequans, apice tantum lobatum, lobo intermedio carnoso erecto 0·1 mm. alto; stigmata lateralia, capitato-clavata, 0·4–0·5 mm. longa; ovarium 4–5 mm. longum.

GABON. Upper Ngounyé River, source of the Wano River, at Mfouba, March 26th 1927, *Le Testu* 6454 (type in Herb. Le Testu).

This rather interesting species does not resemble very closely any known Tropical African species but rather has the appearance of *Goodyera* and allied genera. The glandular hairs so characteristic

of many species of *Cynorchis* are quite lacking in *C. gabonensis* but the floral structure places it in the genus. The rostellum projects forwards horizontally and is almost undivided, the middle lobe appearing as a fleshy upwardly directed knob right between the large viscidia of the pollinia. The stigmata are lateral and free in the upper part. *C. gabonensis* differs from the three species mentioned in the diagnosis in its reclinate anther, this being more or less erect in the other species ; it also has a differently shaped lip.

Habenaria gabonensis *Rchb. f.* in Bot. Zeit. **10,** 934 (1852). *H. psiloceras* Welw. ex Rchb. f. in Flora, **50,** 99 (1867). *H. Milnei* Rchb. f. Otia Bot. Hamburg. 96 (1881). *H. Staudtiana* Kraenzl. Orch. Gen. & Sp. **1,** 320 (1898). *H. Staudtii* Kraenzl. ex Rolfe in Dyer, Fl. Trop. Afr. **7,** 221 (1898.)

An examination of types or isotypes of the above species shows that they are conspecific. I have also seen a number of other specimens collected in Gabon by G. Le Testu. It is evident that the species exhibits considerable variation in the size and shape of the various floral parts while the leaves may be equally distributed all up the stem or grouped more or less in the lower part. Nevertheless the species may be consistently distinguished from *H. procera* Lindl. and *H. Weileriana* Schltr., its two nearest allies. *H. psiloceras* represents a particularly large-flowered form of the species, the spur being exceptionally long, but shows no essential floristic differences from the other specimens.

Habenaria cornuta *Lindl.* in Hook. Comp. Bot. Mag. **2,** 208 (1837). *H. ceratopetala* A. Rich. in Ann. Sci. Nat. sér. ii, **14,** 267, t. 16, fig. 4 (1840). *H. subcornuta* Schltr. in Engl. Bot. Jahrb. **53,** 510 (1915).

Examination of type or authentic material, as well as of many other gatherings of these three species, shows without doubt that they are conspecific. There is a certain amount of variation particularly in the lip and in the length of the anterior petal segments. In several specimens from Tropical Africa the lateral lobes of the lip, which are entire in all the type specimens, are variously toothed or almost pectinate in the lower half. There are, however, all gradations between entire lobes and lobes with six lateral teeth or filiform segments. The spur also varies in length from 14–28 mm. but is otherwise similar in structure. The species ranges from the northern Cameroons in the west to Abyssinia and Kenya Colony in the east and southwards through eastern Africa to Griqualand East, but there are still many large areas within this general range from which the species has not yet been recorded. The most extensive of these lies between the Abercorn district of Northern Rhodesia and the Houtbosch Mountains in the northern Transvaal.

Habenaria (§ Ceratopetalae) cornutella *Summerhayes*, sp. nov. ; quoad floris structuram *H. cornutae* Lindl. similis, sed habitu

graciliore, foliis lanceolato-linearibus, floribus multo minoribus, labelli lobis lateralibus semper integris differt.

Herba terrestris, gracilis, usque ad 65 cm. alta; radices numerosae, interdum incrassatae, anguste fusiformes; caulis erectus, 2·5–4 mm. diametro, ± laxe 7–12-foliatus. *Folia* 4–6 inferiora saepius erecta, linearia vel lanceolato-linearia, acuta, usque ad 24 cm. longa et 1 cm. lata, superiora decrescentia, lanceolata, bracteiformia. *Racemus* 8–14 cm. longus, 3–4 cm. diametro, subdense 10–20-florus; bracteae lanceolatae, acuminatae, usque ad 1·5 cm. longae. *Flores* virides, suberecti; pedicelli cum ovariis 1·5–2 cm. longi. *Sepalum* intermedium erectum, anguste ellipticum, obtusum, 5–6 mm. longum, 2–3 mm. latum, valde convexum, quinquenervium; sepala lateralia deflexa, oblique elliptico-obovata, lateraliter apiculata, 7–8·2 mm. longa, supra medium 4–5 mm. lata, quinquenervia. *Petala* e basi bipartita, glabra sed breviter papillosa; partitio postica cum sepalo intermedio agglutinata galeam formans, linearis, obtusa, 5–6 mm. longa, 0·3 mm. lata, uninervia; partitio antica corniformis, dimidio inferiore porrecto, superiore angustato sursum curvatim reflexo, valde compressa, acuta, 12·5–15·5 mm. longa, inferne 1–1·4 mm. lata. *Labellum* ex ungue circiter 1–1·5 mm. longo columnae adnato tripartitum; partitio intermedia linearis, obtusa, apice incurvata, 11·5–13 mm. longa, circiter 0·6 mm. lata, dimidio inferiore paullo concava; partitiones laterales leviter curvatim divergentes, e basi angusta lanceolato-lineares, superne angustatae, 12–14 mm. longae, basin versus 0·6–0·8 mm. latae; calcar dependens, inferne gracile, triente apicali valde inflatum, medio leviter spiraliter tortum, 12·5–14·5 mm. longum, parte apicali 1·4–1·7 mm. diametro. *Anthera* erecta, apice rotundata, 2·5 mm. alta; canales porrecti, 5–5·5 mm. longi; staminodia transverse elliptica, breviter bilobata, circiter 0·5 mm. longa. *Brachia stigmatifera* recta, gracilia, apice abrupte capitata, 5–5·5 mm. longa; rostelli lobus intermedius triangulari-subulatus, acutus, 1·4–1·8 mm. longus, papillosus, lobi laterales lineares, apice subito incurvati.

Uganda. Kiagwe, Namanve Swamp, in *Saccharum* patches, 1170 m., March 1932, *Eggeling* 571 (type); Sezibwa River, near Ukoko, 1200 m., Dec. 1915, *Dümmer* 2686; Entebbe, in swamp, 1170 m., Sept. 1905, *Brown* 330; Masaka, Lake Nabugabo, in open marsh, 1200 m., April 1935, *Synge* 1951.

Oubangui-Chari. Upper Kotto River, between Yalinga and Bria, July 1922, *Le Testu* 4029.

Evidently a widely distributed plant in the marshes in the vicinity of Lake Victoria. The species lies very near the borderline between sections *Ceratopetalae* and *Bilabrellae*. It possesses the slender habit, long narrow leaves, small flowers and laterally apiculate sepals of Sect. *Bilabrellae* but the erect dorsal sepal and relatively fleshy horn-like anterior petal-lobes are characteristic of Sect. *Ceratopetalae*. Among the species of this latter section *H.*

cornutella is in floral structure a small edition of *H. cornuta* Lindl. the resemblances apart from size being really remarkable. Undoubtedly the two sections are very closely allied structurally, but in the great majority of cases there is no difficulty in assigning a species to its correct section.

Habenaria stenorrhynchos *Schltr.* in Engl. Bot. Jahrb. **20,** Beibl. 1, 33 (1895). *H. dactylostigma* Schltr. in Engl. Bot. Jahrb. **53,** 509 (1915).

On examination of the type gatherings of these two species I fail to find any distinguishing characters, or indeed any significant differences at all. Here we have a species which, although possessing flowers of about the same size as *H. cornutella* Summerh., has the habit and lateral sepals of Sect. *Ceratopetalae* and is a fairly typical member of that section except for the relatively short anterior petal-lobe.

Habenaria (§ Bilabrellae) Linderi *Summerhayes* in Kew Bull. 1931, 381. *H. microsaccus* Kraenzl. in Engl. Bot. Jahrb. **43,** 393 (1909), nomen rejiciendum (Art. 65).

In describing *H. microsaccus* Kraenzlin mentioned that it was characterised by two special features, namely, the very short spur, from which the trivial name was derived, and the "sonderbaren flügelartigen Anhängsel der Anthere." An examination of the type specimen shows that these so-called appendages, which, incidentally, are practically free from the anther to their base, are two additional anthers. Each one is provided with 2 properly constructed thecae and anther canals, though the latter, on account of the absence of supporting rostellum-arms, tend to curl up towards the anther. There are also the usual staminodes on the outside of each lateral anther. No pollinia were seen. This occurrence of two incomplete and ineffective additional anthers must be considered as an abnormal or teratological phenomenon, as in general habit and floral structure *Keil* 63, the type of *H. microsaccus,* is a typical example of Sect. *Bilabrellae.* In most respects, i.e., habit, sepals, petals, lip (except the spur), column and rostellum it agrees with the type of *H. Linderi* Summerh. Both possess petals which, instead of being bipartite almost to the base, as is usual in Sect. *Bilabrellae,* have a united basal portion which is at least 1 mm. long. It is evident from a comparison with both normal and obviously teratological specimens of other species that the type of *H. microsaccus* Kraenzl. is a monstrosity and the name must be rejected under Art. 65 of the International Rules of Nomenclature. It is probable that the very short spur is also an abnormality since in abnormal specimens of other species belonging to Sect. *Bilabrellae* a somewhat similar reduction in the length of the spur is a frequent occurrence.

H. microsaccus was described from near Usumbura at the north end of Lake Tanganyika. *H. Linderi* was first discovered at Bufundi in the extreme S.W. of Uganda; it has since been found on

Mt. Elgon (both Uganda and Kenya sides) and on the Mau plateau in Kenya Colony. The name *H. Linderi* must be accepted as the correct name for this species.

Habenaria (§ Plantagineae) hetaerioides *Summerhayes*, sp. nov. ; a ceteris speciebus africanis sectionis floribus haud resupinatis, labelli lobo intermedio reniformi lobis lateralibus lineari-triangularibus pectinatis multo minoribus facile distinguenda.

Herba terrestris, 5–9 cm. alta ; caulis inferne ± repens vel adscendens, radices flexuosas tomentosas emittens, superne erectus, dense foliatus. *Folia* 5–8, more *Hetaeriae*, basi breviter vaginantia sursum in petiolum falsum 5–7 mm. longum angustata, lamina oblique elliptico-ovata vel elliptico-lanceolata, acuta, usque ad 4·5 cm. longa et 2·3 cm. lata. *Inflorescentia* 2–3 cm. longa, 3–5-flora ; bracteae spathiformes, elliptico-obovatae, apice breviter acuminatae, leviter recurvatae, 7–11 mm. longae, 7–9 mm. latae ; pedicelli cum ovariis circiter 1 cm. longi. *Flores* haud resupinati, succedanei, albi, horizontales, glabri. *Sepalum* intermedium elliptico-lanceolatum, subacutum, valde concavum, 5·5 mm. longum, 2 mm. latum, trinervium ; sepala lateralia ± reflexa, oblique ovato-oblonga, apiculato-acuta, 6·5 mm. longa, inferne 2·5 mm. lata. *Petala* cum sepalo intermedio galeam formantia, leviter curvata, lineari-ligulata, obtusa, 5·5 mm. longa, 0·5 mm. lata, uninervia. *Labellum* sessile, trilobum, totum 9·5 mm. longum ; lobus intermedius ex ungue angusto reniformis, apice valde emarginatus, 8 mm. longus, 12 mm. latus, ungue callo hemisphaerico instructo ; lobi laterales patentes, lineari-triangulares, margine postico breviter pectinati, 2·5 mm. longi, fere 1 mm. lati. *Columna* brevis, circiter 1 mm. alta ; anthera reclinata, canalibus fere 1 mm. longis, polliniorum viscidiis ellipticis 0·5 mm. longis, staminodiis semi-orbicularibus ; rostellum trilobum, lobis fere aequalibus acutis intermedio dorso basi callo rotundato instructo ; stigmata columnaria, obtusa, 1 mm. longa, rostello breviora.

Gabon. Between Heudofala and Adanghé, in very damp forest, July 1917, *Le Testu* 2214 (type in Herb. Le Testu) ; Upper Ogoué River, at the foot of the Badifoulou, March 1931, *Le Testu*, s.n.

This remarkable little species, which bears a strong resemblance vegetatively to the Acrotonous genera *Hetaeria* and *Zeuxina*, is best placed in section *Plantagineae*, the African representatives of this section thus being increased to five. Apart from the creeping and rooting basal part of the stem and the oblique leaves, *H. hetaerioides* is characterised by the relatively large spathe-like broadly obovate bracts and by the single opened flower being horizontally placed with the lip uppermost. The shape of the lip is also remarkable, the reniform middle lobe being many times larger than the basally placed lateral lobes which diverge at right angles and have the dorsal margin broken up into teeth, the longer ones of which are placed apically. The three lobes of the rostellum

all project forwards in the same plane, the middle lobe bearing a sort of mound-like callus on the dorsal surface between the two anther-loculi. This rostellum structure is reminiscent of many species of *Cynorchis* but the stigmata appear to be free from the rostellum and in other respects the plant shows little similarity to that genus; for instance, it is entirely devoid of the glandular hairs so characteristic of *Cynorchis*.

Habenaria parva (*Summerh.*) *Summerhayes*, comb. nov. *Cynosorchis parva* Summerh. in Kew Bull. 1932, 338.

A re-examination of this species and of a number of species of *Cynorchis* and *Habenaria* has convinced me that it is more correctly placed in the latter genus. The unition of the stigmata with the rostellum arms is only in the lower part but I do not now consider this character in itself to be of generic importance. In column structure otherwise *H. parva* differs greatly from the genus *Cynorchis* and approaches much more closely to many Habenarias. In *Habenaria* it is perhaps best included in Sect. *Plantagineae* next to *H. Jacobi* Summerh. which it closely resembles (see Kew Bull. 1935, 197).

Habenaria Lelyi *Summerh.*, var. **macroceras** *Summerhayes*, var. nov.; a typo speciei labelli lobo intermedio lineari-ligulato obtuso, calcari plus duplo longiore differt.

French Equatorial Africa. Oubangui-Chari, Bozoum, July 1931, *Tisserant* 2864 (type in Herb. Le Testu); Jauja Mts., near Bozoum, 900 m., July 1914, *Mildbraed* 9694.

This new variety is almost identical with the type in vegetative characters and general floral structure. The most obvious difference is in the spur which is 6–8 cm. long in var. *macroceras* whereas in the type it is less than 3 cm. long. The middle lobe of the lip is parallel-sided and obtuse in contrast to the almost lanceolate acute middle lobe of *H. Lelyi* type. It seems probable that the two gatherings cited above come from the same locality. The nearest relative of *H. Lelyi* is the East African *H. vaginata* A. Rich. which has much smaller flowers and a spur about 2 cm. long.

Disa patula *Sond.*, var. **transvaalensis** *Summerhayes*, var. nov.; a typo foliis longioribus angustioribus, floribus praesertim minoribus, calcari pro rata longiore differt.

Recently a series of Disas referred to *D. patula* Sond., were received at Kew from the National Herbarium at Pretoria, South Africa, and it was at the same time suggested that there were two forms passing under this name. An investigation of this material has confirmed the suggestion, and the above new variety is here differentiated from *D. patula* type. The specimens of this variety come from the Western Transvaal with the exception of one from Oliviers Hoek, Natal, on the Orange Free State border. The floral structure in general is almost identical with that of the type except

that the spur is on an average relatively longer compared with the dorsal sepal (*D. patula* type, dorsal sepal 10 mm., spur 10·5 mm. ; var. *transvaalensis*, dorsal sepal 8 mm., spur 11 mm.). The flowers are distinctly smaller in all parts except the spur and the inflorescence is consequently narrower. The leaves form another obvious distinction between type and variety. In var. *transvaalensis* the longest leaves reach 9–17 cm. but are only 9–15 mm. wide, whereas in the type they are 7–10 cm. long and 12–22 mm. wide. The inflorescence and leaf characters give a very distinct facies to the new variety but as there are no very clear cut floral differences I do not think it can be considered as a different species. *D. patula* type is found in the Eastern Cape Province and in Natal. *D. stenoglossa* Bolus is rightly referred by Rolfe in Flora Capensis (**5,** sect. 3, 245 : 1913) to *D. patula* in which it agrees with the type form. *Monadenia leydenbergensis* Kraenzl. is also cited as a synonym of *D. patula* by Rolfe, but is quite different in structure, and is indeed included by Rolfe elsewhere in Flora Capensis (l.c. p. 189) in the genus *Monadenia*.

The following specimens of the new variety have been examined (K, Kew Herbarium ; P, Nat. Herb. Pretoria) :—

Transvaal. Pietersburg Distr. : Woodbush, Jan. 1930, *Schweickerdt* 20495 (P). Lydenburg Distr. : Dullstroom, Suikerbos Kop, on stony slopes, 2040–2100 m., Jan. 1933, *Galpin* 11864 (K ; P) ; same locality, Feb. 1933, *Galpin* 12459 (type of variety ; K ; P) ; Graskop, in open veldt, 1425 m., Jan. 1921, *Irvine* 17 (P) ; Mac Mac, near Graskop, *Mudd* (K) ; near Lydenburg, Dec. 1873–Jan. 1874, *Atherstone* (K). Barberton Distr. : Nelspruit, Jan. 1921, *Maggs* 20497 (P) ; Berlin, near Kaapse Hoop, Jan. 1923, *Hofmeyr* 15299 (P) ; Berlin, Godwan River Station, amongst rocks, Jan. 1923, *Hofmeyr & Davison* 19 (P).

Natal. Oliviers Hoek, sources of Tugela River, in stony soil, 1500 m., Dec.–Feb., *Allison* N. (K).

Vanilla heterolopha *Summerhayes*, sp. nov. ; *V. africanae* Lindl. valde similis, sed labelli lobo intermedio quadrato fere rectangulari apice truncato leviter retuso, cristis vel callis valde diversis facile distinguenda.

Herba scandens, glaberrima ; caules flexuosi, graciles, usque ad 70 cm. vel ultra longi, siccitate 1–2 mm. diametro, laxe foliati, e nodis radicantes. *Folia* lanceolata vel oblongo-lanceolata, longe acuminata, basi late cuneata vel subrotundata, breviter petiolata, 5–12 cm. longa, 1·3–2·7 cm. lata, 9–13-nervia ; petiolus gracilis, 0·5–1 cm. longus. *Inflorescentiae* simpliciter racemosae, axillares, 1–3 cm. longae, dense multiflorae ; bracteae ± imbricatae, saepe reflexae vel patentes, ovatae vel triangulari-ovatae, usque ad 4 mm. longae. *Flores* rosei vel roseo-albidi ; pedicelli cum ovariis 1–2 cm. longi. *Sepalum* intermedium oblongo-lanceolatum vel oblongo-oblanceolatum, subacutum vel obtusum, 17–22 mm. longum, circiter 5 mm. latum ; sepala lateralia oblique vel curvatim

elliptico-lanceolata vel elliptico-ovata, obtusa vel subacuta, 16–17 mm. longa, 7·5–8·5 mm. lata. *Petala* oblique lanceolata vel oblongo-lanceolata, subacuta, 16–20 mm. longa, 4·5–5·5 mm. lata. *Labellum* columnae per 7–8 mm. adnatum tubum ore apertum formans, distincte trilobatum, in toto circiter 13 mm. longum; lobus intermedius quadratus, fere rectangularis, apice truncatus leviter retusus apiculo brevissimo latissimo interjecto, medio geniculatim recurvatus, 6·5–8·5 mm. longus, 5·5–7·5 mm. latus, lateribus irregulariter dentatis et undulatis; lobi laterales explanati triangulares, apice tantum liberi, obtusi vel rotundati; lobus intermedius antice cristis tribus intermedia humili interrupta vel verrucosa lateralibus antice humilibus integris laevibus in medio lobi intermedii crassis semicircularibus, postice et in labelli disco lamellis multis quadratis vel linearibus transversis deorsum sensim decrescentibus instructus. *Columna* arcuatim incurvata, circiter 10 mm. longa, semiteres, apice leviter ampliata, basi in alas latissimas labelli lobis lateralibus adnatas dilatata; anthera reniformis, rotundata; rostellum breve, truncatum, latum.

GABON. Upper Ogoué River, Matoro, Oct. 1929, *Le Testu* 7494 (type); Lastoursville, Nov. 1929, *Le Testu*, s.n.; Upper Ngounyé River, between M'bigou and Bagui, Nov. 1925, *Le Testu* 5769. (All in Herb. Le Testu, Caen.)

This very interesting species is almost indistinguishable from *V. africana* Lindl. in vegetative and superficial floral characters. The lip is, however, totally different. Instead of the narrow pointed middle-lobe furnished in the centre with a few retrorse and fimbriate scales, characteristic of *V. africana*, we have in *V. heterolopha* a broad rectangular middle-lobe sharply recurved like a knee in the middle. This and the upper part of the disc bears an assemblage of outgrowths and calli which in their diversity go far beyond those of any African species or indeed of any other species known to me. In the front are three parallel keels, the middle one lower and broken up into a series of knobs, the outer smooth in front but forming at the knee-bend of the lip a pair of swollen semicircular calli similar to those found in many species of *Eulophia*, for example, *E. cristata* (Sw.) Steud. Behind this the crests cease but are replaced by a series of relatively narrow but transversely placed lamellae which become shorter and shorter towards the base of the lip, until they are represented merely by transverse raised lines.

Nervilia subintegra *Summerhayes*, sp. nov.; affinis *N. Fuerstenbergianae* Schltr., a qua scapo longiore, tepalis latioribus, labello ambitu lanceolato indistincte lobato, disco ecalloso facile distinguenda.

Herba terrestris; tuber ellipsoideum, rugosum, circiter 1 cm. longum et 5 mm. diametro, cicatricibus cataphyllorum distincte notatum. *Folia* non visa. *Scapus* erectus, basi leviter flexuosus, gracilis, 7–18 cm. longus, vaginis paucis lanceolatis acuminatis instructus, apice uniflorus. *Flos* horizontalis, flavidus, 2·5–4 cm.

diametro ; bractea anguste lanceolata, subulato-acuminata, 1–1·5 cm. longa ; pedicellus cum ovario 5 mm. excedens. *Sepalum* intermedium oblanceolatum, acutum, 17–19 mm. longum, 3–4 mm. latum ; sepala lateralia oblique oblanceolata, breviter acuminata, 17–20 mm. longa, 3–4·5 mm. lata ; sepala omnia trinervia. *Petala* oblongo-lanceolata, acuta, 16–18 mm. longa, 2·5–3·2 mm. lata, trinervia. *Labellum* ex ungue lato leviter excavato circiter 3 mm. longo columnam amplectente ambitu lanceolatum, medio ita constrictum ut indistincte trilobatum videatur, totum 12·5–15·5 mm. longum, 7 mm. latum, lobis lateralibus rotundatis, lobo intermedio ovato subacuto 7·5 mm. longo 5·5 mm. lato, disco trinervoso, elamellato et ecalloso. *Columna* leviter recurvata, 7·5–9·5 mm. longa, inferne teres, superne valde ampliata.

Oubangui-Chari. Upper Kotto River, Yalinga, March 27th 1923, *Le Testu* 4634 (type in Herb. Le Testu, Caen) " Plante tout entière jaunâtre."

No leaves have as yet been seen but the floral characters easily distinguish the species from all its allies.

Diceratostele *Summerhayes*, gen. nov. *Sobraliinarum*, *Neobartlettiae* Schltr. similis sed columna apice appendicibus duabus linearibus erectis instructa, labello ambitu oblongo medio constricto differt.

Sepala et petala basi ± conniventia sursum leviter divergentia, oblanceolata. *Labellum* basi medio columnae breviter adnatum, oblongum, basi leviter angustatum, medio leviter constrictum, dimidio inferiore lamellis duabus integris instructum, columnam paulo superans et inferne ± amplectens. *Columna* longa, semiteres, apice incurvata appendicibus duabus linearibus erectis vel recurvatis instructa, glabra. *Anthera* terminalis, incumbens, androclinio leviter excavato ; pollinia non visa. *Stigma* subtus anthera positum, excavatum, quadratum.

Planta terrestris ; caules erecti, rigidi, plurifoliati ; folia haud articulata, longe petiolata, elliptico-lanceolata, subchartacea, trinervia ; inflorescentiae solitares, ex axillis foliorum superiorum ortae, simpliciter racemosae, pluriflorae, bracteis floribus multo brevioribus ; flores verisimiliter succedanei.

D. gabonensis *Summerhayes*, sp. nov.

Herba terrestris, usque ad 60 cm. alta. *Radices* supra terram e basi caulium exorientes, rigidae, superne simplices, inferne ramosae, superne usque ad 3 mm. diametro. *Caules* erecti, rigidi, inferne basibus vaginarum foliorum delapsorum nodos incrassatos simulantibus praediti, internodiis brevibus, superne 6–8-foliati, pauciramosi, usque ad 3 mm. diametro, glabri. *Folia* longe petiolata, elliptico-lanceolata vel lanceolato-elliptica, acuminata, basi cuneata, petiolo incluso 11–30 cm. longa, 2·5–6 cm. lata, distincte trinervia nervis subtus prominentibus, interdum ad vaginam et petiolum redacta ; petiolus cum vagina brevi 3–8 cm. longus, supra

canaliculatus. *Inflorescentiae* 3–4 cm. longae, 10-15-florae; rhachis sparse pubescens; bracteae distichae, fere patentes, elongato-cymbiformi-triangulares, acutae, 5–8 mm. longae. *Flores* suberecti, albi. *Sepalum* intermedium ligulato-oblongum, obtusum, fere 2 cm. longum, circiter 3 mm. latum; sepala lateralia oblique oblanceolata, acuta, fere 2 cm. longa, 4–5 mm. lata; sepala omnia extra sparse breviter pilosa. *Petala* oblique oblanceolata, acuta, sepalis paulo breviora, 3·5–4 mm. lata, extra quadrantibus tribus inferioribus carina humili instructa. *Labellum* media basi columnae per 3 mm. adnatum, ambitu oblongum, basi leviter angustatum, medio leviter constrictum, circiter 15 mm. longum, 6 mm. latum, parte antica fere quadrata truncata apice indistincte brevissime tridentata, parte basali utrinque rotundata lamellis duabus integris divergentibus instructa. *Columna* generis, 12–13 mm. longa, appendicibus apicalibus obtusis 3·5 mm. longis 1 mm. latis. *Fructus* immaturi anguste cylindrici, usque ad 3·5 cm. longi.

Gabon. Upper Ngounyé River, Mt. Vianga, between Mouila and Kembélé, near the R. Onoÿ, Feb. 21st 1925, *Le Testu* 5219 (type in Herb. Kew.; paratypes in Herb. Le Testu).

This remarkable new genus seems to be properly placed in the subtribe *Sobraliinae*. Among African orchids it is very similar vegetatively to *Corymborchis* but the anther is placed at the apex of the column and appears to be operculate. Unfortunately no pollinia have been found in the few flowers available for examination. Mansfeld has recently (Notizbl. Bot. Gart. Berl. **13,** 666–667 : 1937) advocated the transference of the two genera *Rolfea* Zahlbr. and *Neobartlettia* Schltr. from *Tropidiinae* to *Sobraliinae* and from examination of both genera I entirely agree that this should be done. *Diceratostele* is undoubtedly closely related to these two genera but differs from both in the remarkable flattened horn-like appendages at the top of the column as well as in the general structure of the lip. It is, however, interesting to note that many species of the genus *Sobralia* itself possess to a much less extent similar appendages at the apex of the column. *Sobralia* differs from *Diceratostele* in many ways, of which the most obvious are the inflorescence and the size of the flowers. The fundamental structure of the column and anther in the genera mentioned above as well as in *Elleanthus* is relatively constant and quite different from that in *Corymborchis* and *Tropidia*. Since Mansfeld has also placed *Arundina* and *Thunia*, both Asiatic genera, in the *Sobraliinae* the discovery of an African genus belonging to this subtribe is of considerable importance.

Oberonia disticha (*Lam.*) *Schltr.* in Fedde Repert. Beih. **33,** 132 (1924).

The occurrence of a species of *Oberonia* on the mainland of Africa has long been known but until recently only sterile or fruiting specimens had been collected. Flowering specimens have been

received at Kew from various sources and examination shows them all to be referable to the well-known Mascarene Island species. This has been known generally as *O. brevifolia* Lindl. but that name is illegitimate and in any case is later than Lamarck's trivial.

I have seen flowering and fruiting specimens of *O. disticha* from Gabon, Uganda and Moçambique and in addition sterile or fruiting material from St. Thomas and Tanganyika Territory. The species is evidently widely spread in the forest zones of the African mainland but so far has not been recorded west of the Cameroons. There is no evidence for the occurrence of more than one species in Africa.

XXIII—NOTES ON MESEMBRYANTHEMEAE: II.* The Lectotypes of Nananthus and Aloinopsis.—A. A. Bullock.

Although fewer than twenty years have elapsed since the late Dr. N. E. Brown commenced segregating new genera from *Mesembryanthemum* L., many nomenclatural difficulties have arisen, due, chiefly, to the serial method of publication adopted by Brown, and to the fact that the type-method was not explicitly incorporated into the International Rules of Botanical Nomenclature until 1930. Even now, the choice of lectotypes is not governed by definite rules, but a notable contribution in this respect had previously been made by the Botanical Society of America, a committee of which, headed by the late Dr. A. S. Hitchcock, in 1918 submitted a report which was published in Science, **49,** 333–336 (1919); at the same meeting the committee was enlarged, and empowered to prepare a code of rules. This appeared in Science, **53,** 312–314 (1921). A series of papers by Dr. T. A. Sprague in the Journal of Botany and in the Kew Bulletin,† includes various suggestions as to methods of typification based on the study of special cases. The following notes are intended to be a further contribution of this kind, and the writer wishes to record his deep appreciation of the help and criticism afforded by Dr. Sprague.

The generic name *Nananthus* N. E. Br. was published in Gard. Chron. **78,** 433 (1925) in a key to genera segregated from *Mesembryanthemum*; no description in the ordinary form was given, and no constituent species were mentioned. The interpretation of *Nananthus* N. E. Br. therefore presented an awkward problem, as it was difficult to decide which species should be placed in it without reference to Brown's manuscript, or to the herbarium material and living plants on which he was working at Kew.

Dr. L. Bolus made the first binomial combination under *Nananthus* when she transferred *Mesembryanthemum albinotum* Haw. to *Nananthus*, in S. Afr. Gard. and Country Life, **17,** 399 (1927). The possible contention that the first species to receive a binomial under a new generic name must be accepted as the lectotype is clearly invalid, since the first binomial might represent a species which

* Continued from K.B. 1937, 497.

† See list of papers by Sprague, p. 160.

the author of the generic name might not even have seen, or which he would have assigned to some other genus. It is thus clear that the case for regarding *M. albinotum* Haw. as the lectotype of *Nananthus* must be considered on its own merits.

The constituent species of *Nananthus* were first listed by Dr. Schwantes in Gartenflora, **77,** 68 (Febr. 1928), and independently by Dr. Brown in Journ. Bot. **66,** 78 (March, 1928). These were *N. albinotus* (Haw.) L. Bolus, *N. albipunctus* (Haw.) Schwantes, *N. aloides* (Haw.) Schwantes, *N. cibdelus* (N. E. Br.) Schwantes, *N. rubrolineatus* (N. E. Br.) Schwantes, and *N. vittatus* (N. E. Br.) Schwantes. No mention was made at this stage of a type-species, the generic name being applied equally to all the six species. Dr. Schwantes' list was non-alphabetical, and *N. albinotus* (Haw.) L. Bolus, was placed first. Whether this indicates (by analogy with the case of *Aloinopsis* given below) that he intended to make *N. albinotus* the lectotype, is uncertain.

In S. Afr. Gard. and Country Life, **19,** 244 (1929), Dr. Bolus wrote, " I should prefer to see *Nananthus* composed of *N. albinotus* L. Bol[us] and *N. albipunctus* N. E. Br. [sic] and the remaining six species enumerated by Schwantes [under *Aloinopsis*: *A. aloides* (Haw.) Schwantes, *A. cibdela* (N. E. Br.) Schwantes, *A. vittata* (N. E. Br.) Schwantes, *A. rubrolineata* (N. E. Br.) Schwantes, *A. transvaalensis* (Rolfe) Schwantes, and *A. rosulata* (Kensit) Schwantes] placed under *Aloinopsis* Schw [antes]." This suggested allocation of species under *Nananthus* and *Aloinopsis* respectively seems to have been due to several causes: (1) Dr. Schwantes, in 1927, had named *Mesembryanthemum rosulatum* Kensit as lectotype of his generic name *Aloinopsis* and this choice appears to have been accepted by Dr. Bolus; (2) *Mesembryanthemum albinotum* was the first species to be given a name under *Nananthus*; (3) *Mesembryanthemum albinotum* and *M. albipunctum* agreed better, in Dr. Bolus's opinion, with the key characters supplied by Dr. Brown. Under certain methods of applying names, such as the so-called principle of residue, the first consideration must be regarded as of primary importance. According to this " principle ", which conflicts with a type-method, a name is retained for what is left after the other original elements have been separated under other names, without consideration of whether any of the elements thus separated may not be the type of the original name. The second consideration has been shown to be of minor importance under a type-method. The first consideration is dealt with below. The third point may now be considered.

Dr. N. E. Brown was the first definitely to indicate a lectotype of *Nananthus*, in Gard. Chron. **89,** 92 (1931), where he stated that the type was *N. vittatus* (N. E. Br.) Schwantes. Since, judging from Brown's published papers, this is *the plant which he knew best,* it may be assumed that he had it chiefly in mind when he proposed the genus in 1925. There is, however, one argument against the choice of this lectotype:—The key to genera of 1925 says of the

stamens of *Nananthus*, " conspicuous, erect," whereas those of *N. vittatus* are closely packed into a broad cone ; they are therefore not strictly erect, but lean slightly inwards. This discrepancy would be of little consequence if all the species originally placed under *Nananthus* were congeneric, but in actual fact a second genus, *Rabiea* N. E. Br., has been segregated from it. These two genera can be distinguished most readily by the stamens, which are strictly erect in *Rabiea*, but collected in a broad cone in *Nananthus* (emend. N. E. Br.). Reading the key literally, the inference might be that Dr. Brown created a new genus, *Rabiea*, for the type element of *Nananthus* N. E. Br. (sens. lat.). It should be remembered, however, that in writing a key, it is essential to emphasize contrasting characters, and the word " erect " in such a place need not be interpreted so strictly as if it occurred in a normal generic description. In the present case, Brown was distinguishing *Nananthus* from *Piquetia* N. E. Br., in which the stamens are " hidden under a dome of inarched staminodes and petals." The word " conspicuous," not the qualifying word " erect " was, therefore, the significant one in the case of *Nananthus*. In these circumstances, to have modified " conspicuous, erect " would have been to complicate still further an already difficult key.

There is thus a strong case in favour of the selection of *Nananthus vittatus* (N. E. Br.) Schwantes as the lectotype of the generic name *Nananthus* N. E. Br.

The case of *Aloinopsis* Schwantes is perhaps more complicated, and as presented here, involves the rejection of a lectotype chosen by the original author of the generic name.

Aloinopsis Schwantes was published in Zeitschr. Sukk. **2,** 177 (1926), and a description was given, in addition to a list of eight constituent species. After the generic description, Dr. Schwantes states, " Hierher gehören die Arten der Sektion *Aloidea* Haw." This, taken in conjunction with the description, the similarity of the names *Aloinopsis*, *Aloidea* and *aloides*, and the fact that *Mesembryanthemum aloides* Haw. is placed first in the non-alphabetical list of constituent species, implicitly indicates that the type-species was *M. aloides* Haw. In the following year (Zeitschr. Sukk. **3,** 105 : 1927), however, Dr. Schwantes published a list of type-species of some of his segregate genera, including *Aloinopsis*, the type-species of which was given as *M. rosulatum* Kensit. No reasons were supplied for this somewhat surprising choice, but since it was the first choice of a lectotype it would normally be accepted unless cogent reasons could be adduced for its rejection.

Returning to the original description of *Aloinopsis*, it will be observed that *M. rosulatum* is mentioned (though not actually by name) as being *exceptional* in the shape of the leaves, which are not *Aloë*-like. Again after *M. rosulatum* (the last species) in the list of constituent species, " Diese Art leitet, aber nur hinsichtlich der breit spateligen Blätter, hinüber zu *Titanopsis* [Schwantes]." The

choice of an exceptional species as a lectotype is clearly undesirable, and should be avoided where possible. The description of the fruit of *Aloinopsis* does not agree with the fruit structure [where known] of any of the species enumerated by Dr. Schwantes under *Aloinopsis*. Under *Titanopsis* (in Zeitschr. Sukk. **2,** 178 : 1926), however, he remarks, " Eine Samenkapsel von *Aloinopsis rosulata* wurde mir von einem der namhaftesten Botaniker des Kaplandes irrtümlich als Frucht von *Mesembrianthemum* [sic] *Bolusii* gesandt, der sie in der Tat ungemein ähnlich war. Auch die Samen sind bei *Titanopsis* völlig anders beschaffen als bei *Aloinopsis*." N. E. Brown later (Journ. Bot. **66,** 78 : 1928) reduced *Aloinopsis* to *Nananthus*, and referred to the above statement as follows :—" The identification of this detached capsule is therefore purely imaginary on the part of the author, for, if the description he gives of it is correct, it bears no resembalnce to the fruit of *M. rosulatum*, and would appear to have been the fruit of some species of *Punctillaria*." Dr. Bolus, in S. Afr. Gard, and Country Life **19,** 244 (1929 also says, " for the only fruit sent to him [Schwantes] appears to have been a detached capsule wrongly named, and this unfortunately proved to be a ' red herring ' in his path." It seems probable that Dr. Schwantes selected *M. rosulatum* as the lectotype of *Aloinopsis* because it was the only species of which he supposed he knew the fruit. This supposition being erroneous, the only reason for selecting *M. rosulatum* as lectotype disappears. On this account, and because *M. rosulatum* is an exceptional species, the writer rejects it as lectotype of *Aloinopsis*, and accepts in its place *M. aloides* Haw., which was implicitly indicated as the type-species by Dr. Schwantes in 1926, and actually chosen as lectotype by N. E. Brown in 1928.

In this discussion, four generic names are involved, and at this point a list of them, with their dates of publication and the type and lectotypes accepted here, will adequately summarize the results obtained.

	Type or Accepted Lectotype.	Rejected Lectotype.
1. *Nananthus* N. E. Br., 1925.	*N. vittatus* (N. E. Br) N. E. Br.	*N. albinotus* (Haw.) L. Bolus
2. *Aloinopsis* Schwantes, 1926.	*A. aloides* (Haw.) Schwantes	*A. rosulata* (Kensit) Schwantes.
3. *Aistocaulon* Poelln., 1935 (= *Acaulon* N. E. Br., 1928).	*A. rosulatum* (Kensit) Poelln.	
4. *Rabiea* N. E. Br., 1931.	*R. albinota* (Haw.) N. E. Br.	

It follows that if *Mesembryanthenum vittatum* N. E. Br. and *M. aloides* are treated as congeneric, *Aloinopsis* Schwantes becomes a synonym of *Nananthus* N. E. Br., and cannot be applied to any group of species segregated from *Nananthus* not including *M. aloides*

Haw. This view was evidently held by Dr. Brown when he created the genus *Rabiea*.

The following list indicates the senses in which *Nananthus, Aloinopsis, Rabiea, Acaulon* and *Aistocaulon* have been interpreted by the three authors concerned, at different times. Type-species definitely indicated by them are in clarendon type.

NANANTHUS *N. E. Br.*

1. Brown, 1925.—No constituent species cited. Generic characters given in a key.
2. Schwantes, 1928.—*Mesembryanthemum albinotum, M. albipunctum, M. aloides, M. cibdelum, M. rubrolineatum, M. vittatum.*
3. Brown, 1928.—*M. albinotum, M. albipunctum, M. aloides, M. cibdelum, M. rubrolineatum, M. vittatum.*
4. Bolus, 1929.—*M. albinotum, M. albipunctum.*
5. Brown, 1931.—**M. vittatum,** *M. aloides, M. rubrolineatum, Nananthus Pole-Evansii.*

ALOINOPSIS *Schwantes.*

1. Schwantes, 1926.—*M. aloides, M. albinotum, M. albipunctum, M. rubrolineatum, M. vittatum, M. cibdelum, M. transvaalense,* M. rosulatum*
2. Schwantes, 1927 —**M. rosulatum.**
3. Brown, 1928.—Synonym of *Nananthus,* excluding *M. rosulatum* ; **M. aloides** was regarded as the nomenclatural type.
4. Bolus, 1929.—**M. rosulatum,** *M. aloides, M. rubrolineatum, M. vittatum, M. cibdelum, M. crassipes, Nananthus Dyeri, N. Peersii* ; Dr. Bolus has added several species since 1929.

AISTOCAULON *Poelln.*(=*Acaulon* N. E. Br., non C. Müll.)

Brown, 1928.—**M. rosulatum.**

Bolus, 1929.—Tentatively rejected.

von Poellnitz, 1935.—Pointed out that *Acaulon* N. E. Br. was a later homonym of *Acaulon* C. Müll. (1847), and provided the new name *Aistocaulon*—**M. rosulatum.**

RABIEA *N. E. Br.*

Brown, 1931.—**M. albinotum,** *M. albipunctum, M. cibdelum, M. carolinense, Rabiea tersa, R. Lesliei.*

An enumeration of the species mentioned in this discussion, with their synonymy and references to the literature, is appended, together with a supplementary list of additional species described by Dr. Bolus under *Aloinopsis* and *Nananthus*. These I have not seen, and do not, therefore, propose to transfer them. According to the list above, Dr. Bolus' interpretations of 1929 indicate that her '*Nananthus*' is *Rabiea,* and her '*Aloinopsis*' is, for the most part, *Nananthus.* One species referred to *Aloinopsis* by Dr. Bolus in

* This is now regarded as a synonym of *M. vittatum* N. E. Br.

1929, namely, *Mesembryanthemum crassipes* Marloth, was treated by Dr. Brown (1931) as a species of *Titanopsis* Schwantes, and in view of doubt as to its correct genus, I have excluded it.

As regards the typification of the four generic names the writer is in complete agreement with N. E. Brown, but it is possible that Brown's taxonomic work may require modification. It is doubtful whether *Aistocaulon* and *Rabiea* are generically distinct from *Nananthus*. One morphological feature on which Brown laid great stress, namely, whether the ovary was inferior or half-superior, seems to be only of specific importance. It is merely a question of the shape of the upper part of the ovary. The ovary of all *Mesembryanthemeae* is inferior, being always immersed in and fused with the torus.

1. **Aistocaulon rosulatum** (*Kensit*) *Poelln.* in Jacobsen, Succ. Pl. 123 (1935).—*Mesembryanthemum rosulatum* Kensit in Trans. Roy. Soc. S. Afr. **1,** 152, t. 21, fig. B (1909).—*Aloinopsis rosulata* (Kensit) Schwantes in Zeitschr. Sukk. **2,** 178 (1926), et *l.c.* **3,** 105 (1927).—*Acaulon rosulatum* (Kensit) N. E. Br. in Journ. Bot. **66,** 77 (1928), et in Brown, Tischer et Karsten, Mesembr. 103, fig. 15 (1931).

Since *Aistocaulon* Poelln. is a monotypic genus, if indeed it is really distinct from *Nananthus*, the nomenclatural type is *Mesembryanthemum rosulatum* Kensit.

2. **Nananthus vittatus** (*N. E. Br.*) *Schwantes* in Gartenfl. **77,** 68 (1928) * ; N. E. Br. in Journ. Bot. **66,** 78 (1928), et in Gard. Chron. **89,** 92, fig. 48, 49 (1931).—*Mesembryanthemum vittatum* N. E. Br. in Gard. Chron. **6,** 772 (1876), et in Burtt Davy, Fl. Transv. **1,** 160, 162 (1926) ; L. Bolus in S. Afr. Gard. and Country Life, **18,** 127, f. 6 (1928), et Notes Mesembr. **1,** 63, fig. 6 (1928).—*M. transvaalense* Rolfe in Bot. Mag. t. 8674A (1916).—*Aloinopsis vittata* (N. E. Br.) Schwantes in Zeitschr. Sukk. **2,** 178 (1926) ; L. Bolus in S. Afr. Gard. and Country Life, **19,** 241, cum fig. (1929).—*A. transvaalense* (Rolfe) Schwantes, *l.c.*

This is the nomenclatural type of *Nananthus* N. E. Br. in Gard. Chron. **78,** 433 (1925).

3. **Nananthus aloides** (*Haw.*) *Schwantes* in Gartenfl. **77,** 68 (1928); N. E. Br. in Journ. Bot. **66,** 78 (1928), et in Gard. Chron. **89,** 92 (in clavi), 133, fig. 67—69 (1931), et in Brown, Tischer et Karsten, Mesembr. 274, fig. 151 (1931).—*Mesembryanthemum aloides* Haw. Suppl. Pl. Succ. 88 (1819), et Rev. Pl. Succ. 87 (1821) ; Burch. Trav. **1,** 332 (1822) ; N. E. Br. in Journ. Linn. Soc. Bot. **45,** 123 (1920) ; Pole Evans in Fl. Pl. S. Afr. t. 54 (1922), non auctt. al. *Aloinopsis aloides* Schwantes in Zeitschr. Sukk. **2,** 178 (1926) ; L. Bolus in S. Afr. Gard. and Country Life, **19,** 244 (1929).

Since, as shown above, this is the type-species of *Aloinopsis*

* Schwantes' paper appeared in February, and Brown's in the following month.

Schwantes, it follows that that name becomes a synonym of *Nananthus* N. E. Br., so long as species 2 and 3 above are regarded as being congeneric.

4. **Nananthus rubrolineatus** (*N. E. Br.*) *Schwantes* in Gartenfl. **77,** 68 (1928); N. E. Br. in Journ. Bot. **66,** 78 (1928), et in Gard. Chron. **89,** 92 (in clavi), 134, fig. 70 (1931), et in Brown, Tischer et Karsten, Mesembr. 276, fig. 153 (1931).—*Mesembryanthemum rubrolineatum* N. E. Br. in Kew Bull. 1911, 82.—*Aloinopsis rubrolineata* (N. E. Br.) Schwantes in Zeitschr. Sukk. **2,** 178 (1926); L. Bolus in S. Afr. Gard. and Country Life, **19,** 244 (1929), et Notes Mesembr. **2,** 129 (1929).—*Nananthus Dyeri* L. Bolus, *l.c.* 83.—*Aloinopsis Dyeri* (L. Bolus) L. Bolus *l.c.* 129, et in S. Afr. Gard. and Country Life, **19,** 245 (1929).

5. **Nananthus Pole-Evansii** N. E. Br. in Gard. Chron. **89,** 92 (in clavi), 133, fig. 64–66 (1931), et in Brown, Tischer et Karsten, Mesembr. 275, fig. 152 (1931).

6. **Rabiea albinota** (*Haw.*) *N. E. Br.* in Gard. Chron. **89,** 53 (1931). —*Mesembryanthemum albinotum* Haw. in Phil. Mag. **68,** 126 (1826).—*Aloinopsis albinota* (Haw.) Schwantes in Zeitschr. Sukk. **2,** 178 (1926).—*Nananthus albinotus* (Haw.) L. Bolus in S. Afr. Gard. and Country Life, **17,** 399, fig. 21 F, et 400, fig. 22 (1927), et *l.c.* **18,** 127, fig. 7 (1928), et *l.c.* **19,** 244 (1929), et Notes Mesembr. **1,** 63, fig. 7, et 96, fig. 21 F, 22 (1928); Schwantes in Gartenfl. **77,** 68 (1928); N. E. Br. in Journ, Bot. **66,** 78 (1928).—*N. Comptonii* L. Bolus, Notes Mesembr. **2,** 120 (1929).

This is the type-species of *Rabiea* N. E. Br. in Gard. Chron. **89,** 53 (1931).

7. **Rabiea albipuncta** (*Haw.*) *N. E. Br.* in Gard. Chron. **89,** 54 (1931).—*Mesembryanthemum albipunctum* Haw. in Phil. Mag. **68,** 126 (1826).—*Aloinopsis albipuncta* (Haw.) Schwantes in Zeitschr. Sukk. **2,** 178 (1926) —*Nananthus albipunctus* (Haw.) Schwantes in Gartenfl. **77,** 68 (1928); N. E. Br. in Journ. Bot. **66,** 78 (1928); L. Bolus in S. Afr. Gard. and Country Life, **19,** 244 (1929), excl. ic.

8. **Raniea cibdela** (*N. E. Br.*) *N. E. Br.* in Gard. Chron. **89,** 54 (1931).—*Mesembryanthemum aloides* Haw. sec. Salm Dyck, Mesembr. § 4, fig. 3 (1840),* non Haw. (1819).—*M. albipunctum* var. *majus* Haw. in Phil. Mag. **68,** 127 (1826).—*M. cibdelum* N. E. Br. in Journ. Linn. Soc. Bot. **45,** 64 (1920).—*Aloinopsis cibdela* (N. E. Br.) Schwantes in Zeitschr. Sukk. **2,** 178 (1926); L. Bolus in S. Afr. Gard. and Country Life, **19,** 244 (1929).—*Nananthus cibdelus* (N. E. Br.) Schwantes in Gartenfl. **77,** 68 (1928); N. E. Br. in Journ. Bot. **66,** 78 (1928).

* The dates of publication of the plates of this work have been the subject of a successful bibliographical research by Mr. W. T. Stearn of the Lindley Library, Royal Horticultural Society, to whom the writer is indebted for this date.

9. **Rabiea carolinensis** (*L. Bolus*) *N. E. Br.* in Gard. Chron. **89,** 53 (1931).—*Mesembryanthemum carolinense* L. Bolus in Ann. Bolus Herb. **3,** 128 (1922) ; N. E. Br. in Burtt Davy, Fl. Transv. **1,** 160, 162 (1926).—*Khadia carolinensis* (L. Bolus) L. Bolus, Notes Mesembr. **3,** 6 (1936).

The writer has seen no material of *Mesembryanthemum carolinense*, and therefore expresses no opinion as to the transference of this species to *Khadia* N. E. Br.

10. **Rabiea tersa** *N. E. Br.* in Gard. Chron. **89,** 54 (1931).

No other author seems to have commented on this and the next species.

11. **Rabiea Lesliei** *N. E. Br. l.c.*

Other species, described by Dr. Bolus.

1. *Aloinopsis Broomii* L. Bolus, Notes Mesembr. **2,** 474 (1935).
2. ,, *Gerstneri* L. Bolus, *l.c.* **3,** 46 (1937).
3. ,, *Jamesii* L. Bolus, *l.c.* **2,** 294 (1931).
4. ,, *Lodewykii* L. Bolus, *l.c.* **3,** 47 (1937).
5. ,, *Loganii* L. Bolus, *l.c.* **2,** 397 (1933).
6. ,, *pallens* L. Bolus, *l.c.* 474 (1935).
7. ,, *Peersii* (L. Bolus) L. Bolus in S. Afr. Gard. and Country Life, **19,** 245 (1929).—*Nananthus Peersii* L. Bolus in Ann. Bolus Herb. **4,** 104 (1927).
8. *Aloinopsis Schoonesii* L. Bolus, Notes Mesembr. **2,** 295 (1931).
9. ,, *Wilmaniae* L. Bolus, *l.c.* 397 (1933).
10. *Nananthus Comptonii* L. Bolus, *l.c.* 120 (1929).
11. ,, *difformis* L. Bolus, *l.c.* 392 (1933).

Considerations Regarding Typification.

1. The first species to receive a binomial under a new generic name is not necessarily the type.
2. A type-species may be implicitly indicated by the author of a new generic name, and due regard should be paid to this point by subsequent authors in choosing a lectotype.
3. Authors choosing lectotypes in accordance with the second consideration should avoid placing undue stress on precise shades of meaning of technical terms used in the original description.
4. When an author chooses a lectotype, his choice should be accepted unless it can be shown that the choice was made in contravention of considerations 2 and 3, or as a result of wrong identification.
5. The choice of exceptional species as generic lectotypes should be avoided.

Select List of Papers, by Dr. T. A. Sprague, Bearing on Typification.

The type-species of Bignonia. Journ. Bot. **60,** 236, 363 (1922), et *l.c.* **61,** 192 (1923).

Statice and Limonium. Journ. Bot. **62,** 267 (1924).

Standard-species. Kew Bull. 1926, 128.

Type-species of Allantoma. Journ. Bot. **70,** 231 (1932).

The type of Ormocarpum Kirkii (with E. Milne-Redhead). Kew Bull. 1934, 43.

Note on typification. Kew Bull. 1936, 441.

The above have been selected from over fifty papers on plant nomenclature, contributed to the Journal of Botany and the Kew Bulletin by Dr. Sprague between 1920 and 1936.*

XXIV—MEERBURGH'S IMPATIENS CAPENSIS.

B. L. Burtt.

Impatiens capensis was described and illustrated by Nicolaas Meerburgh in his little-known work "Afbeeldingen van zeldzaame Gewassen." It is the only one of four new species proposed there whose date of publication is accurately known. A note on the identification of *Impatiens capensis* Meerburgh has been published by Dr. G. M. Schulze of Berlin† since the present article was originally written; it has, however, been revised throughout to take account of his conclusions, which are not altogether in agreement with those expressed here.

The title-page of Meerburgh's book is dated 1775, and this has generally been accepted‡ as the date of the whole work, but it is quite clear from the introduction that it was published in parts of 10 plates and the accompanying text and that 1775 is only the date of the first part.

Impatiens capensis is illustrated on plate 10, the last plate of the first part, and there is no reason to doubt that it was published in 1775. A glance at the plate is sufficient to show that it is quite different from any of the South African balsams and it may, I think, be easily recognized as *Impatiens biflora* Walt. (*I. fulva* Nutt.), a common North American species now naturalized in several parts of Britain. There is no specimen of Meerburgh's now in existence and Schulze (l.c.) is of the opinion that the plate cannot be identified as *I. biflora* with absolute certainty; he therefore ranks *I. capensis* as '*species incerta.*' Several botanists at Kew, however, have recognized the illustration of *I. capensis* as *I. biflora*, and there does not seem to be sufficient doubt to justify the rejection of Meerburgh's

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* While this paper was in the press, a further part of Dr. Bolus' "Notes on Mesembryanthemum, **3,**" appeared in which she treats *Aloinopsis* Schwantes as a synonym of *Nananthus* N. E. Br. and adopts the generic name *Rabiea* N. E. Br. in place of *Nananthus* N. E. Br. emend. L. Bolus (1929). The necessary new combinations are made, together with *Nananthus Orpenii* (N. E. Br.) L. Bolus, and other new species.

† "Über Impatiens capensis Meerburg und Impatiens capensis Thunb." in Notizblatt Bot. Gart. Mus. Berlin, **13,** 662 (Nov. 1937).

‡ For instance, Pritzel, Thes. Litt. Bot. ed. 2, 211 (1872); The Bradley Bibliography **1,** 262 (1911); Cat. Linn. Soc. Library, 524 (1925). In Index Londinensis all the plates are quoted as 1785—evidently a slip for 1775—and Schulze (l.c.) therefore quotes 1785.

name. *I. capensis* Meerburgh (1775) clearly antedates *I. biflora* Walt. (1788) and must therefore stand as the correct name for the North American species, although the specific epithet is unfortunately quite inappropriate.

In " Index Kewensis " *Impatiens capensis* Meerburgh is cited as if it were the same as *I. capensis* Thunb. (1794), although Thunberg applied the name quite independently and to an entirely different plant. Consequently the fact that *I. capensis* Thunb., the name in current use for a South African species, is a later homonym has been overlooked. The question therefore arises, what is the correct name for Thunberg's *I. capensis*?

In 1921 Mrs. Bolus described a balsam from the Knysna forest as *I. Duthieae* L. Bolus, distinguishing it from *I. capensis* Thunb. by its smaller flowers and the shape of the lateral petals. However, when the herbarium material was sorted geographically it was realized that this was the only species that Thunberg was likely to have collected as the others grow further east than he penetrated. An examination of Thunberg's specimen, kindly sent on loan to Kew by the authorities at Uppsala, shows conclusively that *I. capensis* Thunb. (non Meerb.) and *I. Duthieae* L. Bolus are the same and the latter therefore becomes the correct name for this plant and the new name, *I. Marlothiana*, proposed by Schulze (l.c.) is unnecessary.*

The herbarium material is so unsatisfactory that a complete investigation of the South African balsams has not been practicable. Nevertheless it seems fairly certain that specimens from Natal and Transvaal hitherto referred to *I. capensis* Thunb. were wrongly identified.

To summarize, the two species concerned are :—

(1) **Impatiens capensis** *Meerburgh*, Afbeeldingen van zeldzaame Gewassen, t. 10 (1775) ; Plantae Rariores, t. 10 (1789) ; Schulze in Notizblatt Bot. Gart. Mus. Berlin, **13,** 662 (1937). *I. biflora* Walt. Fl. Carolin. 219 (1788) ; Britton & Brown, Ill. Fl. N. United States, ed. 2, **2,** 440 (1913). *I. fulva* Nutt. Gen. Amer. **1,** 146 (1818) ; Syme, Engl. Bot. **2,** 217, t. 314 (1864).

A native of North America naturalized in several parts of Europe.

(2) **I. Duthieae** *L. Bolus* in Ann. Bolus Herb. **3**, 70 (1921). *I. capensis* Thunb. Prodr. Pl. Cap. 41 (1794) ; Thunb. Fl. Cap. **2,** 54 (1818), ed. Schultes 187 (1823) ; Harv. in Harv. & Sond. Fl. Cap. **1,** 312 (1860) ; Marloth, Fl. S. Afr. **2,** pt. 2, 149, 150, t. 50 (1925)—non Meerburgh. *Balsamina capensis* DC. Prodr. **1,** 686 (1824) *Impatiens Marlothiana* G. M. Schulze in Notizbl. Bot. Gart. Mus. Berlin, **13,** 665 (1937).

A native of South Africa, from Swellendam eastwards to Knysna.

* Dr. Schulze tells me that he was unable to examine authentic material either of *I. capensis* Thunb. or of *I. Duthieae* L. Bolus. He therefore had no choice but to accept the alleged differences between them given in the diagnosis of *I. Duthieae*.

Returning to the question of the dates of Meerburgh's work, it has not yet been possible to ascertain the dates of publication of the later parts. The only clue is found in Ehrhart's diary* of a visit he paid to Leiden, where Meerburgh had charge of the gardens, in 1782. Writing on the 21st September of that year Ehrhart mentioned that Meerburgh was publishing the coloured plates and descriptions and that 5 parts had so far appeared. Actually no more was published till 1789 when the whole 5 parts were reprinted, with 5 additional plates, under the Latin title, "Plantae Rariores, vivis coloribus depictae."

Plates 11–50 of the original edition therefore appeared between 1775 and September 1782. It is important, however, that the exact dates of these later parts should be settled, as the names of some of the plants may be affected thereby. For instance, does *Saxifraga stolonifera* Meerburgh (t. 23) antedate *S. sarmentosa* Linn. (1780)? Does *Gorteria araneosa* Meerburgh (t. 40) antedate *G. cernua* Linn. fil. (1781)? The writer will be glad to receive any information which will help to ascertain these dates. It may be mentioned that an examination of Linné's own copy of this work has proved fruitless. Dr. Lam, Director of the Rijks Herbarium, Leiden, and Mr. N. D. Riley, Keeper of the Department of Entomology, British Museum, who was consulted because the work also contains figures and descriptions of *Lepidoptera*, have kindly made enquiries, but they have failed to discover any further information. I am also indebted, amongst others, to Dr. T. A. Sprague, Mr. E. Nelmes and Mr. W. T. Stearn for suggestions and help.

XXV—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XXXV.† Plantae Hintonianae: VII.†

Further Notes on the Genus Bursera. A. A. Bullock.

Two previous papers on Mexican species of *Bursera* have appeared in Kew Bull. 1936, 346 and 1937, 447 and a brief note concerning a collection in northern Mexico was published in Kew Bull. 1937, 515. Since then a further series of over fifty numbers has been received at Kew from Mr. Hinton, and most of these are of sufficient interest to warrant additional notes. A few of Mr. Hinton's earlier numbers which I have previously failed to identify are included, but the remainder are new collections from the districts of Mina and Montes de Oca, in the state of Guerrero.

It is of interest to note that Mr. Hinton's collection, made mainly since the early part of 1932, now exceeds 11,000 numbers, and must rank as the most important intensive collection that has ever been made in Mexico.

Bursera bicolor (*Willd. ex Schlecht.*) *Engl.*; Bullock in Kew Bull. 1936, 354.

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* Beiträge zur Naturkunde und den damit verwandten Wissenschaften, **2**, 115–116 (1788).

† Continued from K.B. 1938, 73.

State of Guerrero. Parotas, Mina District, in an arroyo, a tree 5 m. high, 23 May 1937 (fl.), *Hinton* 10437.

This very distinct species is now well represented at Kew. In addition to the characteristic leaves, which at once distinguish it from all other species, very young specimens may be determined by the presence of a fairly dense glandular indumentum, a feature which is not common in the genus as a whole.

Bursera coyucensis *Bullock* in Kew Bull. 1936, 358, et *op. cit.* 1937, 449.

State of Guerrero. Mina District: Cigarillo, "by the trail," a tree 4 m. high ("see 9047—same tree"), 14 April 1937 (sterile), *Hinton* 10057; Anonas, 200 m., a tree 5 m. high, "frequent here," 16 Aug. 1937 (fr.), *Hinton* 10535.

In the light of all the material of this species now available, I have re-examined the specimens of *Hartweg* 261, formerly tentatively placed under it. I now think that these specimens should be referred to *B. excelsa* (vide infra), a view more in accordance with the geographical distribution of the two species.

Bursera diversifolia *Rose*; Bullock in Kew Bull. 1936, 359, et *op. cit.* 1937, 449.

State of Guerrero. Manchon, Mina District, 1150 m.: "in ripa fluminis [Balsas?] (same tree as 9262)," 21 April 1937 (sterile), *Hinton* 10072; *ibid.*, in an arroyo, 12 May 1937 (fl., young fr.), *Hinton* 10422; *ibid.*, shrub 3 m. high, 14 May 1937 (fl.), *Hinton* 10428.

These specimens constitute a most important addition to the representation of this plant at Kew, and they provide further evidence of its hybrid origin. Mr. Hinton's number 10072 bears leaves only, in all stages of development. These are simply pinnate and afford a striking contrast to those of his no. 9262, from the same tree, which are doubly pinnate. The specimen would have been placed, somewhat doubtfully, under *B. glabrifolia* (H.B.K.) Engl. but for Mr. Hinton's note as to its origin. No. 10422, with young, bipinnate leaves, flowers and young fruits, recalls similar specimens of *B. glabrifolia*, as also does no. 10428, which, however, is in a much younger condition. There is now little doubt that *B. diversifolia* is a hybrid between *B. bipinnata* (Sessé et Moc. ex DC.) Engl. and *B. glabrifolia* (H.B.K.) Engl.

Bursera elemifera (*Royle*) *Baill.*; Bullock in Kew Bull. 1936, 359.

A specimen which must be regarded as the type has now been found in the British Museum herbarium. It bears the legend: "Mexico, Oaxaca,—from Dr. Royle (1846).—The tree which yields Gum Elemi." It is clearly conspecific with the *Finck* specimens previously cited (Bullock, *l.c.*).

Bursera dubia *Bullock* in Kew Bull. 1937, 452.

STATE OF GUERRERO. Placeres—Cigarillo, Mina District: by the arroyo (same tree as 9045), 14 April 1937 (sterile, leafless), *Hinton* 10056; *ibid.*, (same tree as 9045), 23 July 1937 (sterile; mature leaves), *Hinton* 10527.

These additional gatherings are from the same tree as the type specimen; in their sterile condition they could not be readily identified without this knowledge.

Bursera excelsa (*H.B.K.*) *Engl.*; Bullock in Kew Bull. 1936, 360—*Elaphrii? species* Benth. Pl. Hartw. 29 (1839).

STATE OF MEXICO. Rincón del Carmen, District of Temascaltepec, in a barranca, a tree 4 m. high, 2 May 1935, (young fl.) *Hinton* 7723.

STATE OF GUERRERO. Murga, District of Montes de Oca, 100 m., a spreading tree 5 m. high, 21 June 1937 (mature fl.), *Hinton* 10354.

STATE OF GUANAJUATO. Leon, "Copal of the Mexicans; a small tree; May" (very young inflorescences and leaves), *Hartweg* 261.

A re-examination of the available material has now led to the identification of one of Mr. Hinton's earlier numbers which I had placed on one side for further study (No. 7723) and to a new identification of the Hartweg number, which I had referred tentatively to *B. coyucensis* (Kew Bull. 1936, 359). The newly identified material is in a much younger state than any I have seen previously, and all the parts are densely clothed with a pale reddish tomentum, in striking contrast with the very thin indumentum of the mature specimen on which the species was based. These specimens give further support to the delimitation of *B. excelsa* given in Kew Bull. 1936, 360–361, where an extensive new synonymy was proposed.

Bursera fragrantissima *Bullock* in Kew Bull. 1937, 454.

STATE OF GUERRERO. Mina District: Manchon, 1700 m. 22 April 1937 (sterile, leafless) *Hinton* 10085; *ibid.*, 9 June 1937 (fl., young leaves), *Hinton* 10457; *ibid.*, 14 July 1937 (fr., mature leaves), *Hinton* 10495; Carriceras, 1040 m., in an arroyo, a tree 6 m. high, 24 April 1937 (sterile, leafless), *Hinton* 10093; Cundan, 1300 m., 30 June 1937 (fr., mature leaves); *Hinton* 10372; *ibid.*, 1320 m., a small tree on a rock, 29 June 1937 (sterile, mature leaves), *Hinton* 10373; Cundan Chico, 900 m., "very frequent in this valley," 2 July 1937 (fr., mature leaves), *Hinton* 10375.

The three Manchon gatherings cited above are from the same tree as no. 9339, a fruiting specimen which was cited under the original description. Mr. Hinton again notes that the tree is very resinous, and "sap pours out of a pin-prick anywhere in the bark."

Bursera grandifolia (*Schlecht.*) *Engl.*; Bullock in Kew Bull. 1936, 364, et *op. cit.* 1937, 450, in obs.

Seven new collections of this species, five from the district of Montes de Oca, and three from Mina, have been received from Mr.

Hinton, under his numbers 10187, 10188, 10211, 10226, 10420, 10424, and 10431 ; all consist of good flowering material, upon which work on the distribution of the sexes may be undertaken.

Bursera grandifolia forma **robusta** *Bullock* in Kew Bull. 1937, 449.

Mr. Hinton's number 10182 is a collection, with flowers, fruit and young leaves, from the same tree as the type specimen.

Bursera heteresthes *Bullock* in Kew Bull. 1937, 454.

STATE OF GUERRERO. Mina District : Cigarillo, in the arroyo Viscaina (same tree as no. 9044), 14 April 1937 (sterile ; leafless), *Hinton* 10055 ; *ibid.* (same tree as no. 9044), 23 July 1937 (sterile ; mature leaves), *Hinton* 10526 ; Puerto de Oro, 500 m., 29 July 1937 (fr. ; mature leaves), *Hinton* 10529.

Bursera Hintoni *Bullock* in Kew Bull. 1936, 366, et *op. cit.* 1937, 450.

STATE OF GUERRERO. Mina District : Manchon, 1150 m., near the river, a tree 10 m. high, 21 April 1937 (fl.), *Hinton* 10071 ; *ibid.* (same tree as no. 9246), 25 May 1937 (fl. ; young fr.). *Hinton* 10440 ; Carriceras, 1100 m., in an arroyo, a tree 12 m. high 24 April 1937 (fl.), *Hinton* 10091 ; Sta. Ana, 1100 m., in an arroyo, a tree 5 m. high, 29 April 1937 (fl.), *Hinton* 10114.

These additional specimens are all in a fairly young state, and none of them has fully developed leaves. The form of the inflorescence shows its very close affinity with *B. excelsa*, as was indicated in the original description.

Bursera laxiflora *S. Wats* ; Bullock in Kew Bull. 1936, 370, et *op. cit.* 1937, 515.

STATE OF GUERRERO. Petatlán, District of Montes de Oca, a tree 5 m. high, 19 June 1937 (fr.) *Hinton* 10337.

This specimen has much larger leaves, with larger and broader leaflets, than any I have seen hitherto, but I have no hesitation in assigning it to this species. It constitutes a new record for the species, which has been found previously only in the states of Sonora and Sinaloa.

Bursera longipes (*Rose*) *Standl.* ; Bullock in Kew Bull. 1936, 371.

STATE OF GUERRERO. Vallecitos, District of Montes de Oca, 500 m., in an arroyo : slender tree 15 m. high, bark red, wood soft, white, brittle, with very little resin, " frequent, 100 m. to 800 m.", 21 May 1937 (fr.), *Hinton* 10210 ; *ibid.*, 21 May 1937 (mature leaves), *Hinton* 10212 ; *ibid.*, a tree 20 m. high, 23 May 1937 (fl. ; very young leaves), *Hinton* 10220 ; *ibid.*, a tree 15 m. high, 26 June 1937 (fr.), *Hinton* 10369.

VERNACULAR NAME : *Guande colorado.*

Mr. Hinton adds the notes that this is " the tallest of all the *Bursera* [spp.]," and that it is the only one on the coast slope called *guande colorado.* The stature of the tree observed by Mr. Hinton disagrees with that given by Rose, and there is a discrepancy in

connexion with the indumentum. Rose states that the leaves are completely glabrous, even when very young, but Mr. Hinton's specimens show a fairly dense, villous indumentum at the extreme base of the petiole and adjacent part of the young stem, and a similar though less dense hairiness is found in the lower part of the inflorescence rachis.

The group of Mexican *Bursera* species with large entire leaflets and exalate rachis requires further investigation ; most of them are included under the name *B. Simaruba* by Standley (in Contrib. U.S. Nat. Herb. 23, 547 : 1923), but with this view I cannot agree.

Bursera ovalifolia (*Schlecht.*) *Engl.* ; Bullock in Kew Bull. 1936, 373.

State of Mexico. Bejucos, District of Temascaltepec, 610 m., on a dry hill, a tree 10 m. high, very resinous, 16 April 1933 (leafless ; very young infl.), *Hinton* 3787.

State of Guerrero. Placeres, Mina District, 350 m., on a hill, a tree 10 m. high, 15 April 1937 (very young leaves and infl.), *Hinton* 10062.

This species is very closely allied to the preceding, and the material available for study is still inadequate. The indumentum at the base of the petiole and on the rachis of the inflorescence in *B. longipes* is, however, not present in *B. ovalifolia*.

Bursera penicillata (*Sessé et Moc. ex DC.*) *Engl.* ; Bullock in Kew Bull. 1936, 374.

State of Guerrero. Aguazarco, Mina District, on llano in pine forest, a tree 5 m. high, 1 June 1937 (fl. ; fully developed but immature leaves), *Hinton* 10442, 10443.

These specimens are identified with some hesitation, and differ from other specimens of *B. penicillata* in their larger leaves, without the characteristic indumentum in the axils of the leaflets, and usually narrower or obsolete wing of the rachis. The representation of this species at Kew is still inadequate, and fruiting material is particularly required. These two specimens are regarded as atypical. They show an even closer resemblance to *B. fragrantissima* than was indicated in the description of the latter species.

Bursera sessiliflora *Engl.* var. **pubivalvis** *Bullock* in Kew Bull. 1937, 451.

State of Guerrero. District of Montes de Oca : Vallecitos, 760 m., on cliffs, a tree 5 m. high, with milky sap, 22 May 1937 (young fr. ; leafless), *Hinton* 10218 ; *ibid*, a tree 4 m. high 3 July 1937 (sterile, leafy), *Hinton* 10553 ; San Antonio, 900 m. ; a tree 5 m. high, June 1937 (young fr., leafy), *Hinton* 10370 ; Aguazarca, in pine forest, a tree 6 m. high, 2 June 1937 (fl., young leaves), *Hinton* 10446.

The two fruiting specimens cited above have the characteristic hairy drupes by which the variety is distinguished from Engler's

species; the other two have been placed here merely from their occurrence in the same district. All the available material requires further investigation.

Bursera Tecomaca (*Sessé et Moc. ex DC.*) *Standl.*; Bullock in Kew Bull. 1936, 377, et *op. cit.* 1937, 451.

STATE OF GUERRERO. Mina District: Calavera, 500 m., in a barranca, a tree 6 m. high, 16 April 1937 (fr., leafless), *Hinton* 10066; Mesa Queisle, on a hill, a tree 4 m. high, 4 May 1937 (fl.; young, fully developed leaves), *Hinton* 10414; Manchon, in an arroyo, a tree 6 m. high, 14 May 1937 (fl.; young leaves), *Hinton* 10429.

VERNACULAR NAMES. *Guande, Guande colorado.*

The two leafy specimens cited above show that this species exhibits great variation in the length of the acuminate or cuspidate tip of the leaflets. All the young parts are very viscid, and resin exudes from the bark of two- and three-year-old branches, giving them the appearance of having been varnished.

Bursera trimera *Bullock* in Kew Bull. 1936, 379, et *op. cit.* 1937, 452.

STATE OF MEXICO. Nanchititla, District of Temascaltepec, by water, a tree 4 m. high, with white flowers, 11 April 1933 (fl.; leafless), *Hinton* 3765.

STATE OF GUERRERO. Placeres, Mina District, on a hill, a very resinous tree 5 m. high, 15 April 1937 (fl.; leafless), *Hinton* 10061.

The identification of leafless material is becoming more certain as long series of specimens become available. The bark appears to possess characteristic features in almost every species of the genus, and in the present case the identification was made deliberately from the bark alone, and later confirmed by examination of the flowers.

Bursera velutina *Bullock* in Kew Bull. 1936, 380, et *op. cit.* 1937, 452.

STATE OF GUERRERO. Mina District: Placeres–Cigarillo, 400 m., on the roadside, a tree 5 m. high, 5 April 1937 (fl.; leafless), *Hinton* 10016; Cigarillo, on a hill, a tree 4 m. high, 15 April 1937 (fl.; leafless), *Hinton* 10058; Placeres, on a hill, a tree 5 m. high, 15 April 1937 (fl; young leaves), *Hinton* 10064; *ibid.*, a shrub 4 m. high, 2 Aug. 1937 (fr.; mature leaves), *Hinton* 10530; *ibid.*, a shrub 3 m. high, 2 Aug. 1937 (sterile; mature leaves on a long vegetative shoot), *Hinton* 10531.

This is another extremely resinous species; resin has been deposited in a globule about an inch in diameter on a branch of no. 10058. It is translucent, and amber coloured.

XXVI—MISCELLANEOUS NOTES.

Cacti.* For cactus growers, whether amateur or nurseryman, this is undoubtedly the best work in English for the identification of their plants. In spite of the absence of keys to genera and species the 1188 specific descriptions are clear and concise. The 93 photographic illustrations have been chosen with care, and the printers are to be congratulated on the excellence of reproduction.

The classification followed is that of Britton and Rose, and a warm tribute is paid to the lasting value of their monograph. Professor Borg has followed the International Rules for his nomenclature, and it is pleasing to note that he has adopted the conserved name *Mammillaria* Haw. in place of *Neomammillaria* Britt. et Rose. Only two departures from the rules and recommendations have been noted. The first is *Peireskia* instead of *Pereskia* on the ground that Linné wrote the latter " . . . . evidently by mistake, in commemoration of Nicolaus C. F. Peireskius." Professor Borg wrote this under a misconception ; the name *Pereskia* was originally published by Plumier, Gen. Nov. 35 (1703), in honour of " D. Nicolaus Peireskius," so that clearly Plumier made no mistake in the spelling but deliberately latinized it. The name *Pereskia* proposed by Plumier was first validly published not by Linné, but by Philip Miller in 1754. The relevant references are given by Sprague in Kew Bull. 1928, 359, in a paper on the " Correct spelling of generic names " which Professor Borg has apparently overlooked. The second is explained by the author on page 47 ; " . . . . I am using invariably a small letter when the specific name is a pure adjective . . . " Thus *Echinocactus Grusonii* is used, and *Selenicereus grusonianus*. A small initial letter is also used for trivials which are vernacular names or old generic names.

Professor Borg is clearly not in favour of the excessive " splitting " of genera which has become common in recent years. On page 47 he says, " There is a growing suspicion, perhaps not altogether unfounded, that . . . . the original conception and value of a generic name are being too frequently departed from by systematic botanists. There is little doubt that several of the new genera are so ill-defined, and the characters on which they are founded are so uncertain, that very often the same species is classified under different genera by expert botanists . . . . " One may agree with this general indictment, but it requires modification. The " splitters " are usually botanists who have little or no knowledge of other groups of plants, and are inclined to found genera on characters which are of only specific importance.

A few new species and varieties are described in the text, such as *Opuntia neuquensis*, p. 67, and these are accompanied by Latin as well as English descriptions. No type-specimen is cited, however,

* " Cacti. A Gardener's Handbook for their Identification and Cultivation." By Professor J. Borg, pp. xi + 419 + 46 photographic plates (93 illustrations). Macmillan & Co., London, 1937. £1 1*s*. net.

and one must assume that the type is a living plant seen by the author.

On pages 48–49 a useful systematic list of the tribes and genera of *Cactaceae* is given, with the number of species in each genus, and the number described in the text.

Professor Borg's adherence to the Britton and Rose classification is convenient to the botanist but makes consultation of the work by the gardener more difficult, owing to the species being arranged systematically. In small genera of only a few species this is not serious, but in large genera such as *Opuntia* (181 species described) or *Mammillaria* (158 species described), an alphabetical arrangement under the sections, with a key to the sections, would have been preferable.

The brief bibliography, which precedes the very complete index, includes only six books in English, and of these, only one, the Britton and Rose monograph, can rival the present work in scope. In general usefulness, Professor Borg's book is unequalled.

On the purely cultural side, there is nothing new, but the advice given is sound and useful. There are chapters on " Soil," "Potting," " Watering," " Care of Seedlings," " Propagation," by cuttings, offsets, grafts, etc., and on " Hybridization," and the book concludes with a summary of cultural hints describing the conditions under which each genus or tribe will flourish. A. A. BULLOCK.

Hardy Bulbs.*—Some fifty years ago hardy and especially half-hardy bulbs were grown in great quantity in the British Isles, but their popularity waned. Since the Great War a new and enthusiastic body of collectors and cultivators has arisen and at the present time several nursery firms are offering a very extensive range of bulbs, corms and tubers amongst which are many plants new and unfamiliar even to the keen gardener. The more these plants were cultivated the more obvious it became that the literature available required to be brought together in an up-to-date and concise form. This service has been rendered by Lt.-Colonel C. H. Grey, who is the possessor of an unrivalled collection and is one of the most enthusiastic cultivators in the country. The author has not merely given an account of all the well-known species of monocotyledous bulbous plants in cultivation but has attempted to make the work practically exhaustive. The task, therefore, which he set himself was an immense one, since the literature is extremely scattered. It necessitated nothing less than a search through the Index Kewensis of most of the relevant genera of the families in question, and extracting the names of all species which had been introduced to gardens or which might, in the author's

* " Hardy bulbs: including Half-hardy Bulbs and Tuberous and Fibrous-rooted plants." By Charles Hervey Grey, Lt.-Col., D.S.O., F.L.S. Vol. I. Iridaceae. London, Williams & Norgate, Ltd. 1937. 8vo. Pp. xxvi + 403. 47 pls. Price £1 16*s*.

opinion, profitably be introduced. The original descriptions in various papers, monographs and floras were then transcribed or, when in another language, translated into English.

So far the first volume only has appeared, which covers the *Iridaceae*, but we understand volume 2, which deals with the *Orchidaceae* and *Amaryllidaceae*, and volume 3, which treats of the *Liliaceae*, will appear before the end of the year. The *Iridaceae* alone embrace about 50 genera and over 2000 names (including synonyms); these are arranged alphabetically, so that it is the work of a moment to turn up any species.

With regard to the classification, where revisions or monographs are available these have been followed, and in addition a certain amount of published critical work has been sought out and incorporated. In the main, however, the author has followed the only course which was perhaps feasible in the circumstances, namely, that of providing in each genus a list of species (including synonyms) with descriptions, without any attempt at critical treatment. The result is that the accounts vary considerably; those of certain genera are sound and up-to-date (e.g. *Iris*—which appears to have been particularly well done) whilst that of others (of which *Gladiolus* is a notable example) will require copious revision as more knowledge accumulates. This is inevitable, and if realized from the start will prevent disappointment. General notes on cultivation, and special notes in certain cases, are given but much is left for the cultivator himself to discover: any attempt to give details would have unduly increased the size of a volume already rather large.

The work, which represents a prodigious amount of concentrated effort, is very well got up, and is copiously illustrated by Mrs. Grey's well-known and spirited drawings, many of which are in colour. Horticulturists will be grateful for so comprehensive a treatise which brings together in the English language within the compass of three volumes a multitude of descriptions hitherto scattered and only available for consultation in two or three of the largest botanical libraries in the country.

The Lily Year-Book.*—The Lily Year-Book published by the Royal Horticultural Society always covers a wide range of interest. A paper by K. E. Toms, Agricultural Officer, St. Helena, gives an account of the cultivation of *Lilium longiflorum* in that island. The species was mentioned by Mellis in his standard work and it is evident that it was introduced as early as 1875. During recent years efforts have been made to grow it on a large scale for export purposes, especially for autumn and winter flowering in England. Mr. Toms explains the steps taken to increase the stock and to keep it free from virus diseases. Two papers on lilies on calcareous

* "Lily Year Book, No. 6, 1937." Royal Horticultural Society, London, 1937. Pp. 153, 26 figs. Price 5*s*. paper, 6*s*. cloth.

soil and lime-free soil, by F. C. Stern and F. Stoker respectively, are of special value to gardeners in showing the significance of factors such as aeration, water supply and dressings of humus in connexion with the calcareous habitat. Another article of unusual interest is an account of a lecture by Mrs. Constance Spry on the decorative value of Lilies. A survey of Forrestian lilies by Sir William Wright Smith gives a useful summary of *Lilium* as it occurs in Yunnan, Szechwan and S.E. Tibet. In addition to the above there are accounts of the " Discussions " of the Lily Group in 1937 and numerous short articles both horticultural and botanical, all of which are of interest to growers and students of the genus.

An Artist's Herbal.*—In this attractive volume Miss Mansfield has brought together thirty-eight pencil drawings of medicinal and other herbs grown in the United States. Each plate is accompanied by a few lines of text describing the habit and uses of the plant illustrated. The information given is rather meagre and the value of the work lies in the plates, which, for the most part, give an excellent idea of the character of the plants they represent. Many of the subjects are treated rather as formal designs than naturalistic plant portraits. There is an introduction by Mrs. Fox, dealing with the history and cultivation of herbs in America.

Ecology in Town and Classroom.†—This volume is a companion to the same author's " Field Studies in Ecology," which was noticed in K.B. 1935, 584. The earlier work dealt with a scheme of outdoor ecological work developed in connexion with the author's classes at Bristol University, and in the present volume Dr. Bracher shows that valuable practical work can also be carried out in the vicinity of towns. There are chapters on the vegetation of streets, coal tips, muddy river banks, and other urban habitats, and also a section on the study of turf samples in the classroom. The two volumes together form a valuable guide to the conduct of elementary ecological courses in schools and universities.

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* By Louise Mansfield. The Macmillan Company, New York, 1937. Pp. 76. Plates 38. Price 10*s.* 6*d.*

† By R. Bracher, M.Sc., Ph.D. J. W. Arrowsmith, Ltd., Bristol, 1937. Pp. 96, plates 3, figs. 9. Price 2*s.* 6*d.*

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